

solution has the osmotic pressure of about one half of the physiologic saline solution and is chemically composed of sodium phosphate in a ratio of $\text{Na}_2\text{HPO}_4 : \text{NaH}_2\text{PO}_4 = 7 : 3$ with a small amount of sodium chloride produced by the procedure of pH adjustment. The *G-M* counter estimates that the stock solution contains about $1/15 \mu\text{c}$. For the biological tracer experiments described in the following report 0.5c.c. of the stock solution was injected subcutaneously to a mouse.

9. Some Experiments on P^{32} .

III. Biological Tracer Experiment.

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Of the radioactive phosphate stock solution, which had been prepared as stated above (I, II), 0.5c.c. lots were injected to male mice subcutaneously. The lot of the solution, which was administered to each mouse, contained P^{32} with the activity of about $0.005 \mu\text{c}$ and the carrier P^{31} weighing 0.84 mg and of pH 7.2. Each two mice were killed every three, twelve and twenty-four hours respectively after the injection, and bones, liver, kidneys, muscles, testes, spleen, small intestine and blood plasm were removed from these animals, and the tissues were ashed, treated with dilute hydrochloric acid and desiccated. The measurement of P^{32} content in these desiccated samples with the *G-M* counter were carried out as mentioned above (I). One mouse was killed fourteen hours and twenty minutes after the injection, and the whole body tissues, the urine and the feces with the gastrointestinal contents of this animal were examined in the same manner as aforesaid.

The radioactive phosphorus in the tissues per unit weight was most abundant in bones, and in less quantities in liver and plasm, while small intestine, spleen, kidneys, testes and muscles contained minute amount of P^{32} per unit tissue weight.

The radiophosphorus content of bones, liver and plasm diminished rapidly, and that of testes slowly decreased, while in kidneys the labeled element was of the highest amount at twelve hours after the injection, while in other tissues the content of P^{32} did not particularly change with the lapse of time. Estimating the whole weight of these tissues of one mouse, and calculating the P^{32} content in them, we found that the bulk of the radiophosphorus was in bones and muscles, while liver, plasm and small intestine contained only a small portion of the injected P^{32} , and in kidneys, testes and spleen the labeled element was in minute amount.

In fourteen hours and twenty minutes after the injection, ten and eleven per cent of the radiophosphorus was eliminated from the kidneys and the gastrointestinal tract respectively, when seventy-nine per cent of P^{32} was retained in the body tissue.

Three hours after the injection we found a marked rise of the white cell count and the shift to the right of the nuclear count. The leukocytosis was assumably due to the mobilization of old leukocytes. The white cell count after twelve and twenty-four hours respectively after the injection fell toward the original value. The red blood cell count was not essentially altered through the injection. A contrast experiment with the injection of carrier phosphate solution without P^{32} to mice revealed no essential shift of the white cell count.

10. On the 1.5 cm Wave Length Microwave Spectroscope.

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The description of the 1.5 cm wave length microwave spectroscope designed and constructed by us is given.

The signal oscillator consisting of klystron 2K25 sends 3 cm wave length energy, a part of which is converted to 1.5 cm energy by means of frequency converter formed by ridge type wave guide, coaxial line and silicon crystal.

The signal oscillator is frequency-modulated by saw-tooth generator which also gives sweep voltage to the oscillograph.

The frequency-modulated 1.5 cm energy is led into the absorption cell wave guide, where the existing sample amplitude-modulates the wave energy corresponding to its absorption character.

The output wave energy from the absorption cell is detected by a crystal detector, and this detected absorption wave is amplified, and applied to the oscillograph.

The low frequency amplification is practised in two ways. One way is the direct amplification using video amplifier and the other is the method in which the signal oscillator is further modified by 463 kc/sec and the absorption curve is amplified on the carrier frequency of 463 kc/sec using 463 kc/sec narrow band receiver.

A part of 3 cm wave length energy is utilized for the wave length measurement and to give the frequency marker pip on the oscillograph screen.

The pressure of the vacuum attained is as low as 10^{-6} mmHg in the absorption cell, the pressure measurement being carried on with Phillips gauge.

In our design and construction, we struggled with the difficulties in getting components manufactured with meager materials and money.

We express our heartfelt thanks to Dr. O. Cary who helped us to get klystron and silicon crystal, and to others in our laboratory for their cooperation.